

# Language Heedless of Logic – Philosophy Mindful of What? Failures of Distributive and Absorption Laws

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**Abstract:** Much of philosophical logic and all of philosophy of language make empirical claims about the vernacular natural language. They presume semantics under which ‘and’ and ‘or’ are related by the dually paired distributive and absorption laws. However, at least one of each pair of laws fails in the vernacular. ‘Implicature’-based auxiliary theories associated with the programme of H.P. Grice do not prove remedial. Conceivable alternatives that might replace the familiar logics as descriptive instruments are briefly noted: (i) substructural logics and (ii) meaning composition in linear algebras over the reals, occasionally constrained by norms of classical logic. Alternative (ii) locates the problem in violations of one of the idempotent laws. Reasons for a lack of curiosity about elementary and easily testable implications of the received theory are considered. The concept of ‘reflective equilibrium’ is critically examined for its role in reconciling normative desiderata and descriptive commitments.

Key words: logic, natural language, lattice axioms, multilinear semantics

## Overview

This essay aims to show that there is something wrong with a most popular and elegant hypothesis about the coordinative recursion of meanings in natural, vernacular languages. The hypothesis entails that such recursion satisfies the lattice-theoretic laws of classical and intuitionistic logic. The facts are otherwise, and not altogether boringly so. Section 1 recalls the tradition of logical semantics for natural, vernacular languages and some familiar ways of addressing known wrinkles. Section 2 presents armchair experiments for testing some laws so far untested and finds them violated. Section 3 argues that the ‘Gricean’ approach of pragmatic ampliation, when explicated

in a framework (e.g. Gazdar 1979) that allows it to make falsifiable predictions, does not save the phenomena for logic. Section 4 asks what will save the phenomena. It briefly considers, but neither expounds nor tests substructural logics and a conceivable semantics in linear spaces. Section 5 returns to the normative and descriptive commitments of applied philosophical logic and observes that conflicts are sometimes dealt with by appeal to the notion of ‘reflective equilibrium’. The line taken is against doing so. Section 6 concludes with an outlook. The Appendix is a heuristic towards meaning composition in ordered vector spaces on which ‘and’ and ‘or’ denote various instances of linear combination.

## 1 True religion

If there is anything which holds together the current mainstream of analytic philosophy, it is one composite assumption. The assumption is that logic provides a basic framework both for norms of right reasoning and for descriptive meaning theories of our natural, everyday vernacular.<sup>1</sup> Philosophers reason in the vernacular most of the time, so the second part of the assumption is a prerequisite for daily practice conforming to the first. The twofold idea is all but taken for granted in the typical introductory courses in logic and philosophy of language. It is not decisively repudiated at research level.

The basic compositional component of meaning, on this view, is given by logical syntax and by semantics in truth or verification conditions. This component is held to come in a wrapping of conversational pragmatics and perhaps other, purely conventional speech act paraphernalia and assertibility requirements. The wrapping serves to take up the slack between the predictions of logic and the philosopher’s phenomenological data. These data are in large parts spontaneous native speaker intuitions on acceptability and paraphrase of word strings, extended by judgments of coherence for sets of strings. When the strings should be grammatical sentences by rules of syntax and the

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<sup>1</sup>‘Logic’ means by default classical or intuitionistic logic. ‘Meaning theory’ refers to the implicit theory by which speakers of a language attach meanings to the phonological and syntactic objects that they produce and perceive. The ‘theory of meaning’ aims to make it explicit. I think the late Michael Dummett made this nonce terminological distinction at one time.

slack is in places where the logical operation meanings appear impugned, the extra-logical accretions must square accounts.

The paradigm for this descriptive strategy is set by Frege. For sentence schema ‘*A but B*’, he claims truth-conditions  $A \wedge B$  and the intimation of a contrast between *B* and what should be expected in view of the foregoing.<sup>2</sup> For the warranted felicitous assertibility of ‘*If A, then C*’ he gives three conditions: ( $\alpha$ ) The material implication,  $A \supset C$ , must be known to be true; ( $\beta$ ) the truth values of *A* and of *C* must be unknown; ( $\gamma$ ) there must be some connection of cause or necessitation between *A* and *C*.<sup>3</sup>

With reference to ‘*A or B*’, Ernst Schröder (1890:134f.) establishes a sub-paradigm of meaning supplements which are rationalized by appeal to desiderata of cooperative conversational conduct.<sup>4</sup> The usual intimation of ‘*A or B*’ is that the assertor does not know which of the disjuncts is true. The rationale is found by *reductio*. The truthful speaker must know that  $A \vee B$  is true. Had he known which of *A* or *B* was true, we expect that he would have affirmed a (i)

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<sup>2</sup>Frege (1879:§7). I substitute the English equivalent for his German. A fairly comprehensive theory of ‘*but*’ in the doxastically interpreted probability calculus is in Merin (1999). In the present text, logical symbols have their classical interpretation. I use them indifferently to denote truth-functional connectives and concomitant operations of a boolean algebra of denotations, be it of sets of states of affairs, elements of a Lindenbaum algebra, or *sui generis*. This is how many classic texts on boolean algebras have proceeded. If you prefer, imagine lattice operator symbols ‘ $\sqcap$ ’, ‘ $\sqcup$ ’, ‘ $\sqsupset$ ’, etc. In algebraic mode, I use the equality symbol ‘ $=$ ’ where logical syntax would have a biconditional. Classical, material implication is denoted by the horseshoe ‘ $\supset$ ’. ‘XOR’ designates exclusive disjunction.

<sup>3</sup> Op.cit. §5. Frege is not widely known for this. In §12, he explicates ( $\gamma$ ) by instantiation of a lawlike generalization  $\forall x[Px \supset Qx]$  (‘for any individual *x*: *x* having property *P* implies *x* having property *Q*’). Set  $A = Pa$  and  $C = Qa$  for some *a*. However, this is not the only conceivable approach to the elusive requirement ( $\gamma$ ). **Theorem:** When ( $\alpha$ ) and ( $\beta$ ) are explicated in the doxastically interpreted probability calculus as ( $\alpha\pi$ )  $P(A \supset C) = 1$  and ( $\beta\pi$ )  $0 < P(A), P(C) < 1$ , they jointly entail ( $\gamma\pi$ )  $P(C|A) > P(C)$ , which explicates positive evidential relevance of *A* to *C*. *Proof:* easy exercise; ( $\beta\pi$ ) can be weakened to ( $\delta\pi$ )  $0 \neq P(A) \wedge P(C) \neq 1$ , since  $\alpha\pi, \delta\pi \vdash \beta\pi$ .  $\square$  The probabilistic doctrine of ‘*but*’ presented in Merin (1999) extends to predicate languages for inductive reasoning. Like the application of the theorem, this work presupposes a classical logical skeleton for the vernacular.

<sup>4</sup>Schröder is best known for the first, if somewhat staggeredly presented axiomatization of boolean algebras and for having lent his name to the Schröder-Bernstein Equivalence Theorem, of which (as Felgner 2002:587 recalls) he had offered a first, albeit defective proof sketch.

“more informative” and (ii) “shorter” expression alternative, namely one of  $A$  and  $B$ . Since he did not, he will not know, and if he did know all the same, we should feel that we had been misled.<sup>5</sup> Under the programmatic rubric ‘Logic and Conversation’ (Grice 1967), this doubly rational enterprise has captured the imagination of the analytic mainstream and of its linguistic derivatives.<sup>6</sup> Gone are the days when the later Wittgenstein and J.L. Austin could persuade sizeable philosophical constituencies to do without the assumption of a logical skeleton and muscle to our vernacular, or even to deny the assumption.

Victorious logic comes with interpretations in truth conditions or warranted belief-conditions. In this form, the tenet that logic—here understood as in logic primers or in a non-monotonic variant as in Lewis (1973)—supplies the basic meaning theory of the vernacular is a deep secular conviction of the analytic trade, at the very least of a very prominent faction of it. The two most obvious reasons for its hold on the imagination are two findings, one positive, one negative, by philosophers who are at ease with elementary logic.

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<sup>5</sup>Schröder’s argument is taken up in passing by Tarski (1946:§8), who uses *Algebra der Logik* extensively in 1930s/40s research work, in Quine (1950:§3), who also transposes to ‘if’, and finally, with higher profile, in Grice (1961). The Schröder-Grice intimation also entails that the speaker does not know whether  $A \wedge B$ , the putative denotation of ‘ $A$  and  $B$ ’, is true. A stronger intimation would be that he knows it to be false, i.e. that  $A$  and  $B$  exclude one another. This intimation, which is often felt to be made, if for the most part vaguely so, is not entailed by the Schröder-Grice assumptions. However, suppose the predominant vagueness of the mutual exclusion intuition is taken seriously as a datum, and not simply treated as noise in data collection or a reflex of unresolved ambiguity. And suppose a probabilistic doxology is again adopted. Then the Theorem of note 3 has, by way of Frege’s assertibility doctrine and his definition ‘ $A \vee B$  iff  $\neg A \supset B$ ’, a pertinent **Corollary**: Felicitously asserted  $A \vee B$  always has  $A$  negatively relevant to  $B$  (i.e.  $P(B|A) < P(B)$ ) and, of course, vice versa. The special case of extreme negative relevance (when  $P(AB) = 0 < P(A), P(B) < 1$ ) will explicate unvague intuitions of disjointness.

<sup>6</sup>The programme accommodates, as lexically ambiguous, words which have a logical rendering, but which also have occurrences that must *a priori* refuse it. Example: ‘and’ will denote arithmetical addition, ‘+’, in ‘Two and two is four’. — Highly involved theories, be they deterministically ontological, probabilistic or otherwise plausibilistic in the sense of graded modality, have been and are being offered for conditionals, both indicative and subjunctive. Their logics are eminently non-classical, lacking notably monotonicity a.k.a. ‘Weakening’ or ‘Thinning’ (i.e.  $A > C \not\vdash AB > C$ , see e.g. Lewis 1973), but they presuppose a classical logic for all modal- and conditional-free fragments of the language.

(A) They find overwhelming evidence for a high degree of compositionality in everyday language. (B) They find it hard to conceive of a matching meaning theory worth the name that is not, at the core, hard logic supplemented by pragmatic wrappings of varying softness. But the tenet about logic also has the status of an article of faith. Analytic philosophers use the vernacular as a would-be universal language, like everyone else. Unlike everyone else, however, they also want that which they hear and say to be intelligible by the gold standard of intelligibility. Logic provides that standard. For a suitable choice of logic, classical logic for many of us, it provides the gold standard of rationality.

The predicate ‘rational’ is, of course, commendatory, indeed emotive. We notice at the latest when considering its contrary, ‘irrational’. Unless one is out to upset the bourgeois, rational is something one should wish to be. But one’s language is a part of one’s being that is criterial for the attribution of rationality, and a conviction that matches a wish in the manner of Hegel’s dictum about the Real being Rational is wish-conforming. What conformity to the wish adds to the conviction is a potential for confirmation bias, a reduced willingness to test the conviction as assiduously as any other scientific hypothesis. The tendency does not imply that our thinking has been wishful. Only a demonstration of the tenet’s falsity could do that. But it does imply an attitude characteristic of True Religion which is independent of the truth, falsity, or meaninglessness of that faith’s world-descriptive claims.

Now, if philosophy tries to live up to its characteristic tradition of self-reflection, logic as putatively descriptive of vernacular meaning must be more than a matter of conviction-by-default let alone blind faith. Logic will also be part of an empirical science, much as a mathematical theory of gravitation and a theory of one’s scientific instruments are part of physics. Such a science must be experimental in one way or another, and indeed vernacular-describing science *is* experimental. Philosophers have for long conducted armchair experiments on what strings of words make sense or are apparent nonsense. They intuit what sentences follow from what sentences and whether pairs of sentences are equivalent in meaning. These sentences may be found in print or made up on the spot. Thus, one should have expected at least routine armchair testing of the basic laws of the presumed theory. People had, after all, bothered to test Newton’s laws of motion and gravitation with clocks, balances, measurement rods, and, if need be, the aid of vacuum pumps.

However, this humdrum expectation is wide of the mark. There is no record of the critical experiments having been conducted. One might conclude that philosophers and linguists take the object of language science to be less important than physicists have taken that of physical science. The conclusion would be consistent with their simply not bothering to check. But in the cases to be examined, the crucial experiments of first resort are so obvious and so inexpensive to run that a slightly different hypothesis would be no less well supported. The hypothesis would be that contemplators who are independent-minded enough not to take easily testables for granted have, without quite realizing it, adopted an attitude of studied disregard. This hypothesis motivates our section heading. It also motivates a bit of tedium to come. Experimentation, as post-Aristotelian ‘natural philosophy’ realized, is about closing loopholes to false doctrine. This is also what cogent argument is about.

## 2 Its well-kept little secret

Here is the kind of armchair experiment which is never conducted in the literature.<sup>7</sup> The experiment consists of two parts. Part 1 might offer for contemplation (psychologists would say: as an experimental stimulus) this pair of suitably anodyne word strings:

- (1a) Anna is affable, and Brenda is benevolent or Cindy is careful.
- (1b) Anna is affable and Brenda is benevolent, or Anna is affable and Cindy is careful.

The typographic convention is that the bolded comma followed by an extra space represents prosodic grouping. The auxiliary theoretical presumption will be that grouping represents ‘scope’, i.e. ordering of semantic recursion. Thus in (1a), what ‘or’ stands for will be presumed to be applied to form a compound before the denotation of ‘and’ is applied to this compound and a second conjunct. The canonical translation into mathematical bracketting sees (1a) bracketted as ‘*Anna is affable and (Brenda is benevolent or Cindy is careful)*’, and (1b) as ‘*(Anna is affable and Brenda is benevolent) or (Anna is affable and Cindy is careful)*’.

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<sup>7</sup>Two near-exceptions are known to me, from 1914 and 1985. They are discussed in sections 4 and 5, respectively.

Instructions to contemplators are twofold. (I) Judge for each of (1a) and (1b) whether it is intelligible or at any rate acceptable as a well-formed utterance of English! (II) Judge whether or not (1a) and (1b) are equivalent in meaning! Readers can now perform the experiment inexpensively in the double role of experimental subject and observer. The prediction is that (1a) and (1b) are each found to be well-formed and intelligible and to be equivalent in meaning: if either one is to be judged true (or false) so is the other. Affirmations for (II) would presumably entail affirmations for each question of (I).

Part 2 of the experiment would repeat the procedure upon having (1a) and (1b) replaced with examples (2a) and (2b):.

- (2a) Anna is affable, or Brenda is benevolent and Cindy is careful.
- (2b) Anna is affable or Brenda is benevolent, and Anna is affable or Cindy is careful.

I predict: (2a) will be found acceptable and intelligible. (2b) will be found odd – in robust language, ‘weird’ – or indeed unacceptable as a felicitous utterance and will quite possibly be found unintelligible in virtue of this ill-formedness. (2a) and (2b) will not be judged intuitively equivalent in meaning. We can leave open whether or not this is owed to the weirdness of (2b). Replacing (2b) by (2b’) ‘*Anna is affable or Brenda is benevolent, and Cindy is careful or Anna is affable*’, will not in any significant way change the pattern of judgments. Observe that the occurrences of ‘*and*’ and ‘*or*’ are all of the unexotic, sentence-conjoining, order-insensitive kind. They ought to translate well into elementary logic, not as ‘*and*’ fails to in ‘*Kim and Sandy are a happy couple*’, or ‘*It is possible to see Naples and die, but impossible to die and see Naples*’.

That said, the experimental paradigm is robust across ‘coordination reduced’ uses of the connectives. The reduced sentences are less unwieldy, yet their synonymous re-expansion shows that the connectives retain their unexotic, sentence-connecting properties. Thus, we find the same pattern as above for pairs of sentence pairs whose second pair (structurally akin to 2a,b) is

- (3a) Kim is affable, or she is benevolent and careful.
- (3b) Kim is affable or benevolent, and she is affable or careful.

The small print for ‘*she*’ indicates de-stressing, which ensures that ‘*she*’ refers anaphorically to Kim. Using the optional pronoun here is a way of ensuring groupings as intended before and thereby, one hopes, the associated scope

relations of ‘*and*’ and ‘*or*’. A noticeable hiatus after the comma can thus be dispensed with and the results confirm that the unacceptability of (2b) is unlikely to be due to confusion about groupings. The same response pattern as for (2) and (3) also attends sentence coordination reduced into subject position. Here the optional predicate occurrence printed in parentheses can be used as a grouping device that makes reliance on prosody superfluous.

- (4a) Anna (came), or Brenda and Cindy came.  
 (4b) Anna or Brenda (came), and Anna or Cindy came.

The reduced analogues of (1a,b) will elicit the same doubly affirmative judgments as the original. To see the import of these findings, recall that our working sentential logics, among them most prominently classical logic and intuitionistic logic (for which ‘*A or not A*’ is not a tautology), validate the dual pair of distributive laws:<sup>8</sup>

- (Dis.1)  $A \wedge (B \vee C) = (A \wedge B) \vee (A \wedge C)$ .  
 (Dis.2)  $A \vee (B \wedge C) = (A \vee B) \wedge (A \vee C)$ .

Here ‘=’ may be interpreted as logical equivalence *qua* or as algebraic identity.. (Dis.2) and (Dis.1) are interderivable in lattices which generalize boolean algebra, formerly known as ‘the algebra of logic’. In lattice symbolism, the relation schema ‘ $X \leq Y$ ’ stands for logical ‘*X* entails *Y*’, and ‘ $X = Y$ ’ thus stands for reciprocal entailment.<sup>9</sup>

The data from (2), (3), and (4) tell us that no logic validating distributivity is *prima facie* descriptively adequate, because (Dis.2) fails to be validated by intuitions (i.e. spontaneous native speaker judgments) on acceptability and

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<sup>8</sup>There is no universal numbering convention for the three dual pairs of laws we shall consider. Some authors state first that law which has ‘ $\wedge$ ’ as the first or sole connective in its standard form, others opt for ‘ $\vee$ ’ first. For simple rhetorical effect, I shall order pairs so that the first-numbered of each pair corresponds to the (more) mellifluous English form.

<sup>9</sup>Reminder: the Lindenbaum Algebra of a language  $L$  of classical logic, whose elements are the equivalence classes of logically interderivable sentences of  $L$ , is a boolean algebra. An arbitrary lattice (see briefly e.g. Mendelson 1970: Ch. 5), unlike the boolean variety, need not have an operation corresponding to negation, and need not satisfy (Dis). In lattice terminology, ‘ $\wedge$ ’ and ‘ $\vee$ ’ instantiate ‘meet’, and ‘join’, respectively. Let us very generously call ‘*familiar*’ any sentential logic whose algebra of sentence equivalence classes modulo interderivability is a lattice.



paraphrase.<sup>10</sup> Suppose failure *prima facie* does persist *secunda facie* after we have failed to come up with credible auxiliary theories which save the phenomena for logic. Then we might conclude that the logic of our vernacular language, *as manifest in paraphrase and acceptability judgments*, is one whose algebra must be a non-distributive lattice. But this conclusion is premature. All lattices and all logics proposed for general-purpose, rational, declarative argumentation satisfy the dual pair of Absorption Laws which may, but need not, be seen as the special case  $C; = A$  of the distributive laws:

$$(\text{Abs.1}) \quad A \vee (A \wedge B) = A.$$

$$(\text{Abs.2}) \quad A \wedge (A \vee B) = A.$$

The scientifically obvious move will now be to elicit judgments of acceptability and paraphrase for corresponding candidate instances.

(5a) Anna is affable, or Anna is affable and Brenda is benevolent.

(5b) Anna is affable.

(5c) Anna is affable, and Anna is affable or Brenda is benevolent.

(5c') Anna is affable, and Brenda is benevolent or Anna is affable.

We find that each of (5a) and (5b) is individually acceptable and intelligible, but that the pair are not judged to be equivalent in meaning. It takes considerable indoctrination – in the noblest of senses – into norms or conventions of argument to be convinced that an utterance of (5a) deductively commits the speaker or the believer to no more and no less than (5b).<sup>11</sup> But suppose that this indoctrination is successful or that our intuitor is a natural born logician and will immediately spot that all the speaker of (5a) can be nailed down to in adversarial dialogue is (5b). Then the real trouble is yet to come..

Sentence (5c) will be judged weird or indeed unacceptable. So will its variant (5c'), synonymous by intuitive and logical commutativity of 'or'. This indi-

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<sup>10</sup> In the very different descriptive domain of reconstructing how scientific measurements are combined, distributivity appears to fail for crucial instances in quantum mechanics, unlike in classical mechanics (Birkhoff and von Neumann 1936). Measurement statements are identified with whole subspaces of a system-state vector space. The subspaces form a lattice, with  $\wedge$  as intersection and  $\vee$  as 'linear span' (never mind the latter's exact definition). Under the canonical mapping of combining-operations to statement connectives, the combination law which fails on quantum physical grounds is not (Dis.2), but (Dis.1).

<sup>11</sup> Ignore that (5a) commits us to Brenda's existence: recall example forms (3a,b).

cates that purely syntactic confusion with a schema ‘ $(A \text{ and } A) \text{ or } B$ ’ cannot explain why (5c) is bad. It follows for reasons apparent in (2b) that (5a) and (5c) will not be judged intuitively equivalent. This does not preclude that *secunda facie* construals of (5c) which make for intelligibility in spite of weirdness will likewise fail to be judged equivalent to each of (5b) and to (5a). Conjunction-reduced analogues to (3) and (4) will follow the same pattern as (5) does.

Thus, English and similar languages fail to validate (Dis.2) and each of (Abs.1) and (Abs.2), but in asymmetric ways. The candidate instance of (Abs.1) has each side of the equivalence acceptable, but fails equivalence; while (Abs.2) fails already due to unacceptability of its longer side. Lattices and their associated logics obey a Duality Principle: any valid equality in ‘meet’ ( $\wedge$ ) and ‘join’ ( $\vee$ ) terms remains valid if each connector is replaced by the other. Apparent violations of duality will already dispose us to conclude that, if any one of ‘and’ and ‘or’, label it  $\sigma$ , fails to denote its logical correlate, so will the other, dub it  $\tau$ .

This heuristic can be filled in. Suppose, as is likely, that there are no other familiar logical correlates available. For ‘and’ there is no such candidate in sight, and XOR won’t do for ‘or’ (see note 15). Then ‘ $X \sigma Y$ ’ would, if at all, denote a complex which cannot be the input to any other familiar logical connective. But sentences (1a) and (1b) are both perfectly good and in at least one of them  $\sigma$  supplies an input to  $\tau$ , schematically ‘ $Z\tau(X\sigma Y)$ ’. Thus, we have a domino effect: if one logical interpretation goes, the others go too. (‘Unfamiliarly’ logical  $\sigma$  that save the phenomena are not in my present sight.) Next, we consider another dual pair of laws in the context of a conceivable remedy. This will point the finger at ‘and’ – in elementary, old-fashioned philosophical logic the least controversial of connectives – as the primary problem.

### 3 Grice will not save

‘Grice saves’ was how the late linguist, James D. McCawley, titled a section in his comprehensive book from the heyday of logico-linguistics (McCawley 1981). In view of the reverential prefix ‘Grice taught us that ...’ which one is apt to meet in the philosophy of language, his two-word description of Grice’s role seems like doubly fair comment. So: will He save here? Initial cause for optimism arises with the Idempotent Laws, which hold for all lattices and known logics of general-purpose declarative mode argumentation.

(Ide.1)  $A \vee A = A$ .

(Ide.2)  $A \wedge A = A$ .

An instance experimental setup for testing their validation would be given by contemplata

(6a) Anna is affable or Anna is affable.

(6b) Anna is affable.

(6c) Anna is affable and Anna is affable.

The considered judgment will presumably be that each of (6a) and (6c) is odd, weird, or indeed unacceptable.<sup>12</sup> The question of their *intuitive* equivalence to (6b) may remain unanswered, because one is puzzled by them. If just one example is found acceptable, it will surely be (6a). For (6c), charitable reconstrual will presumably be needed. Now, among Grice's mutually known rules of cooperative conversational conduct there is one that he dubbed the 'Maxim of Manner', which went 'Be perspicuous!'. Its most tangible specifying submaxim is 'Be brief', or, in Grice's own paraphrase, 'Avoid unnecessary prolixity' (cp. Schröder's (ii), p. 3 above). It seems reasonable to see the bare oddness judgments which attend (6a) and (6c) as being predicted by ( $\alpha$ ) the shared presumption that speakers avoid needless prolixity and by Grice's further presumption ( $\beta$ ) that no overriding communicative purpose would be served by violation of the maxim. Each of (6a) and (6c) is considerably more verbose than its putative logical equivalent (6b). There is no apparent reason, say, etiquette or a quest for *gravitas*, why the longer form might be preferred, at any rate not before irony or sarcasm exploit the perceived oddity.

Suppose we are satisfied with binary (in)acceptability judgments. Then Grice does save for (Ide.1) and (Ide.2). This will be no mean feat, because (Ide.2) is the modern way of expressing what Boole (1854:49) called the 'fundamental law of thought', characteristic of the algebra of logic. The thought behind it, plainly stated, is: '*Saying the same thing twice over does not increase its evidential value*'. Its great competitor is what psychologists call the Law of Effect, whose relevant instance is: 'People will believe anything if you repeat often enough what speaks for it'. This makes Boole's law

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<sup>12</sup>With (6c) worse. If its badness feels like giving way to a construal in terms of two distinct occasions of showing affability, use '*Anna is tall*', '*Anna is Austrian*' or suchlike.

a cherishable intellectual good, and makes it antipsychologistic in a most un-metaphysical of senses. If Brevity saves it for language, we are in business.

However, Brevity will not explain the badness of the right-hand side [RHS] of (2b), i.e. the violation of (Dis.2). This is because the RHS of (1b), which would instantiate the RHS of (Dis.1) is equally long, yet fully acceptable. Similarly, acceptable (5a), which would instantiate the left-hand side [LHS] of (Abs.1) is no less prolix than unacceptable (5c), the would-be instance of the LHS of (Abs.2). If the import of these observations were to restrict Brevity's explanatory ambit to (Ide), the Gricean enterprise could count itself lucky. But it cannot. The fully acceptable and intelligible RHS of (2a) [putative for the RHS of Dis.1] is noticeably longer than its putative logical equivalent LHS. Moreover, the fully acceptable and intelligible (5a) [putative for the LHS of Dis.2] is overwhelmingly longer than its putative logical equivalent (5b). These observations show conclusively that Brevity affords no explanation at all. Its apparent success with (Ide) is spurious coincidence.

Appeal to Brevity is also apt to make us overlook the very different ways in which schemata 'A or A' and 'A and A' are odd. Take 'A and A' with stative A, say '*Kim is tall*'. Statives (the taxonomy of which the term is part goes back to Aristotle and has well-known 20th century developments by Anthony Kenny, Zeno Vendler, and David Dowty) do not allow an additive construal as '*Kim talks and (Kim) and talks*' would. With statives (and also with 'achievements' e.g. '*Kim turned 90*' and 'accomplishments' e.g. '*Kim broke the rear window*') 'A and A' is irremediably weird. Any use of it will be sharply derogatory or insulting of someone, by default the addressee. 'A or A', by contrast, is much less grating to the mind's ear. It can be used as a bantering presentation of Hobson's Choice in act or fact.<sup>13</sup> 'Be brief' has the virtue of brevity as an explanans, but few others.

Will 'Be informative', the first of Schröder's desiderata, as rephrased by Grice under the label 'Quantity', save the phenomena? Informativeness, too, has received an intelligible explication among Griceans, namely Schröder's, in terms of comparative logical strength.<sup>14</sup> X is logically stronger than Y if X

<sup>13</sup>Is that philosophy? Well, it's not incuriosity.

<sup>14</sup>Grice had two other maxims besides 'Manner' ('Be Brief', 'Be perspicuous') and 'Quantity'. Of those, 'Quality' says 'Be truthful and warranted', and it resembles G.E. Moore's and Max Black's idea that speakers, in Black's (1952) diction, represent themselves as knowing or believing what they assert. 'Relation' or 'Be relevant'

entails  $Y$ , but is not entailed by it. Example: let  $X = A$ ,  $Y = A \vee B$ . ‘*Or*’ is Schröder’s 1890 and one of Grice’s 1961 paradigm examples for reasoning by informativeness to generate what Grice called a ‘generalized conversational implicature’ attaching to an expression type. Since ‘*or*’ occurs in putative correlates of (Abs) and (Dis), Informativeness is a candidate explanation once the fate of implicatures is accounted for when ‘ $A$  *or*  $B$ ’ occurs in a complex. By contrast, the schema ‘ $X$  *and*  $Y$ ’ of which ‘ $A$  *and*  $A$ ’ is an instance has no Gricean implicature apart from speaker’s knowledge of its truth, i.e. that of its conjuncts. There remains Grice’s ‘Relevance’. With Tarski loc.cit. we should demand under this rubric that  $X$  and  $Y$  concatenated by either connective not be too conceptually disparate, as ‘3 is prime’ and ‘The weather is fine’ are. But this is evidently not our problem.

Let us begin with the simplest schemata. The badness of ‘ $A$  *and*  $A$ ’ remains unexplained. ‘ $A$  *or*  $A$ ’ might draw on Frege’s supplementation doctrine, translated mechanically from ‘*if*’ (p. 3 above) to ‘*or*’ by way of the classical logical equivalence  $(X \vee Y) \equiv (\neg X \supset Y)$ , i.e. ‘ $X$  OR  $Y$ ’ is true iff ‘NOT  $X$  IMPLIES’  $Y$ ’ is. If the assertor of ‘ $X$  *or*  $Y$ ’ conventionally intimates (i) knowledge that  $X \vee Y$  is true and (ii) ignorance about the truth value of disjuncts, then instantiating each of  $X$  and  $Y$  to  $A$  will generate an epistemic contradiction, since  $A \vee A \equiv A$ . To be sure, a mechanical intimation of ignorance would be required for this, and there must not be a precedence protocol by which one of (i) and (ii) pre-empts the other.

Gazdar’s (1979) seminal algorithm for assigning these formulaic kinds of implicature to arbitrarily complex sentences,  $S$ , has a precedence protocol on very general grounds. ‘Assertions’ of one subclause,  $W$ , of  $S$  may conflict with ‘potential implicatures’ of another subclause,  $Z$ . These would be the implicatures generated by stand-alone utterances of  $Z$ . The protocol gives assertions precedence, as it must, and keeps conflicting potentialities unrealized. This happens without a fuss. But perhaps stand-alone (6a), which paradoxically

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has no explication in Grice, nor in work beholden to his. His own 1967 example is someone abruptly starting to talk of the weather to intimate that the prior topic is embarrassing. Merin (1999) first examines a moderately protestant would-be alternative to Grice. This purports to characterize relevance and make it predict, but inadvertently reduces it to Grice’s Informativeness and Perspicuity. The proposal in Merin (1999) is for explicating relevance with J.M. Keynes, Carnap and others in probability theory. This is applied to explain data addressed by Griceans. References to uses of probability in the present essay refer to this approach.

unites the roles of  $W$  and  $Z$ , will make a fuss, even though by Schröder-Grice inference no implicature and hence no conflict could arise.

The schema ‘ $A$  or  $B$ ’ is often taken to generate a further Informativeness implicature, namely that the speaker knows  $A \wedge B$  to be false. This ‘strong’ implicature will not arise by Grice-Schröder reasoning alone. Gazdar generates it as another conventional, derogable default; Soames (1979) does so casuistically.<sup>15</sup> Applied to (6a) it would instantiate to: ‘speaker knows that  $A \wedge A$  is false’, which reduces to ‘speaker knows that  $A$  is false’. Epistemic and alethic paradox by contradiction with assertoric ‘speaker knows that  $A$  is true’ is again avoided by sensible precedence of assertions. I conclude that the explanatory potential of Informativeness for intuitions about (6a), which relate to ‘or’ and (Ide.1), is uncertain, and for those about (6c), which relate to ‘and’ and (Ide.2), nil.

A like pattern emerges on applying Informativeness to (Abs). (5a) is as acceptable as (5b). (5a) at first sight intimates speaker’s ignorance of which of its disjunct propositions,  $A$  and  $A \wedge B$ , is true. There can be no such intimation in (5b). A failure of intuitive equivalence, *contra* (Abs.1), could be put down to this difference. But granted the primacy of assertion (‘speaker knows the disjunction to be true’) over implicature, the speaker of (5a) cannot be ignorant about  $A$ , since (5a) has the truth conditions of (5b). To make the putative explanation of felt inequivalence work, people’s interpretive parts of mind must fail to realize that (5a) has the truth conditions of (5b). But this is to pull the rug from under the Gricean enterprise. The failure of semantic competence could not be explained away as one of poor ‘performance’ due to

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<sup>15</sup>For Soames, it arises when the speaker can be presumed to know that ‘ $A \wedge B$ ’ is true if it is true, and to know that it is false if it is false. This double presumption and Schröder ignorance jointly entail that he knows ‘ $A \wedge B$ ’ to be false. ‘Strong’ implicature is to explain why ‘ $A$  or  $B$ ’ is often (mis)construed as  $A \text{ XOR } B$ . There is indeed good reason to avoid XOR: ‘ $A$  or  $B$  or  $C$ ’ would be true iff an odd number of disjuncts are. In Merin (1994: Ch. 3) Gazdar’s algorithm for implicature projection is modified to cover  $n$ -fold disjunction for  $n > 2$ . These cases have rightly been noted by McCawley (1981) to be intractable by Grice’s original doctrine. (The adequacy proof for the extension is by complete induction. In subsequent work I have extended Soames’s algorithm to  $n > 2$ . There are differences potentially reflected in prosody.) The probabilistic approach of note 5 above could motivate Gazdar’s unvague lexical default assumption by a relevance-compositional rationale for  $P(AB) = 0$ : this condition guarantees that the relevance of  $A \vee B$  to any  $H$  is a convex combination of the relevances of  $A$  and of  $B$  (Merin 2006:Th.3).

limited working memory. Our example sentences are short already and the patterns persist for two-word instances of ‘*A*’ and ‘*B*’.

Undaunted, the supplementarian might address the weirdness of (5c) as follows. Its two conjunct propositions, *A* and  $A \vee B$ , are each asserted. By the first, the Quality-conforming speaker must know that *A* is true. The second has *A* as a disjunct and so intimates that the speaker does not know whether *A* is true. So there is a *prima facie* contradiction of intimations. In (5a), by contrast, it may have taken some reasoning – too much for the naive intuitor – to recognize a contradiction. But again: no contradiction can persist in (5c) under any conceivable implicature projection scheme. All must prioritize assertoric commitments and so block the ignorance implicature from arising. For a Schröder-Gricean, it could not even arise momentarily. Hence, the explanation attempt is again one of uncertain purchase.

(Dis) fares worse. Weird (2b) is a putative instance of the right-hand side of law (Dis.2). It offers no foothold even for mere attempts to explain its weirdness by contradictory potential implicatures. Assertion of the schema (*A or B*) and (*A or C*) must generate implicatures of ignorance about the truth values of *A*, *B*, and *C*. These implicatures are jointly consistent with speaker’s knowledge, by ‘Quality’, of the truth of the non-implicatural content. Adding ‘strong’ implicatures from conjuncts ‘*A or B*’ and ‘*A or C*’, namely that the speaker knows each of  $A \wedge B$  and  $A \wedge C$  to be false, preserves consistency. No prioritization is needed. Hence, the uncertain explanation for the oddity of (5c) could be no more than a fluke. To sum up: the findings in this section cannot allay fears that, in respect of logic and implicature, Grice was misled, and was apt to mislead a congregation which wanted to be led exactly where he did in fact lead them to – the place they were already at.

## 4 What will?

Two kinds of conceivable salvation are at issue. One kind would save logic – that is: some logic widely acceptable as a working logic of scientific and like-minded argumentation<sup>16</sup> – as a theory which describes the recursive skeleton

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<sup>16</sup>As distinct, for instance, from a logic with models in chemical process engineering or in architectural design or in pattern constructions traditionally effected by categorical, extended Chomsky phrase structure or Lindenmeyer grammars. See p. 19 on a logic with such models, *inter alia*.

of our vernacular meaning theory. The other kind would merely save the theory of meaning from the sceptical conclusion that there is no theory worth calling so that will reconstruct our naive practice. More specifically: it would save it from the conclusion that there is no such theory which is as mathematically intelligible as a logical theory, and thus conveyable in the Sciences' unambiguous *lingua franca*.

I know of no auxiliary theory that will deliver salvation of the first kind. The *prima facie* most obvious candidates in the paradigm known as 'Gricean' were found wanting in section 3. One might thus try to preserve logical conservatism by replacing Schröder's and Grice's most interesting resource, Informativeness defined by logical entailment, by something else. The obvious candidate for those familiar with the philosophy of science and the tradition of logical empiricism will be inductive, that is, measure-theoretically explicated relevance 'for' or 'against' a contextually given thesis. Evidence  $E$  for a thesis proposition  $H$  makes  $H$  more probable when it is updated on, evidence against makes it less probable. A corresponding change in conditional probability conditionalizes the update relation, most literally so when updates are by conditioning a probability function.

Relevance thus defined in the probability calculus presupposes and in this sense conservatively extends classical logic (Merin 1997, 1999). There was evidence for the advisability of a move from entailment to thesis-driven relevance from the outset. O'Hair (1969) observed that Grice's Informativeness cannot in fact explain his very own key 1961 example, namely that  $(\alpha)$  '*It looks red to me*' implicates  $(\beta)$  'The speaker is not certain that it is red'. For  $(\alpha)$  is not, as the Gricean construal of 'Informativeness' would have to assume, logically weaker than  $(\gamma)$  '*It is red*'. Neither statement entails the other.<sup>17</sup> The story for  $(\alpha)$  cannot then be the Gricean story of 'or'.

What could explain the intimation  $(\beta)$ ? Suppose a context of use in which  $(\gamma)$  is a stronger argument for some  $H$  at issue than  $(\alpha)$  is. i.e. suppose that the assumption of  $(\gamma)$  raises our degree-of-belief in  $H$  (our personal probability that  $H$  is true) more than assuming  $(\alpha)$  does. (Say:  $H$  = 'It's oxide of mercury', or  $H$  = 'It's a Communist flag'.) Grant also that the paradigm for our vernacular discourse situation is issue-based and thus at least in parts competitive,

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<sup>17</sup> I have not seen a Gricean reply or acknowledgement in print.



just as classical rhetoric assumed. Then we can infer the intuited intimation, namely that the speaker lacks warrant for ( $\gamma$ ).

Comparative Relevance so explicated is unlike comparative Informativeness, which is not directional to some  $H$  and so is non-partisan. In Grice's deductive world,  $A$  is more informative than  $B$  iff  $A \models B$  while  $B \not\models A$ ; making allowances for degenerate entailments by the contradiction, e.g.  $0 = 1$ . Suppose relative informativeness is itself defined more generally in measure-theoretic terms as uncertainty-reduction. Then it will be the expectation, a probability weighted sum, of relevances. (This is a standard way to interpret 'relative entropy', the quantity which the update scheme of conditioning and a salient generalization of it minimize.) The expectation operator, as always, binds and thus 'kills' a variable. Here, in particular, it thereby kills issue-based directionality. Directionality goes with debate or, less nobly put, with persuasion in line with a speaker's interests. It does not go well with Grice's quiet transformation of eminently partisan classical rhetoric (whose theory of tropes harbours the inferencing principle of implicatural indirection) into a pragmatics of cooperative, efficient and, for theoretical purposes, disinterested information transmission.

Suppose our pragmatics were to be such.<sup>18</sup> Suppose it thus extended to engage 'or'. Then I would still not see a conservative solution for all three dual pairs of problems. Here, briefly, is a summary of why not.<sup>19</sup> Re (Ide.2): A probabilistically explicated Relevance requirement, dub it 'R', on ' $A$  and  $B$ ' could be that the amount of its evidential relevance in favour of some logically independent proposition  $H$  at issue be construable as both non-nil and additive by default. Specifically, additivity should be satisfiable under some probability assignments and for a widely preferred relevance measure such as the log-likelihood ratio (Merin 1999).<sup>20</sup> 'R' would be unsatisfiable for  $B = A$  as in (6c). Why assume 'R'? For one, because a probability condition guaranteeing such

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<sup>18</sup>Modulo an account of how the vernacular's compositional meaning engages the classical logic of proposition spaces on which probabilities are defined, I think it is such.

<sup>19</sup>Readers who use probability theory a lot will be on familiar ground when it comes to the basic tool. Others might be content to note that this approach has been tried. In the current state of discussion, it could itself be considered somewhat *avant garde*, but for our present problem it would be, I think, another instance of rearguard action.

<sup>20</sup>The measure's aficionados include C.S. Peirce, D. Wrinch and H. Jeffreys, A.M. Turing, and most prominently I.J. Good.

additivity, namely independence conditional on each of  $H$  and  $\neg H$ , entails, for  $A$  and  $B$  that are each positive to  $H$  short of making it certain, an ordering by increasing relevance:  $A \vee B \prec X \prec A \wedge B$ , where  $X$  is either of  $A$  and  $B$  when they are equi-relevant, else the more positive (ibid.:Th.6). Try: ‘Candidate 1 has convictions for tax evasion or mail fraud’. However, logic and ‘R’ will not suffice to explain problems with (Abs) and (Dis). Re (Abs.2): ‘R’ would explain the badness of (5c) if  $A \vee B$  having zero relevance, e.g. with  $A$  positive and  $B$  suitably negative to  $H$ , could be ruled out. But I don’t see how. Re (Dis.2): I do not see why bad (2b) could not satisfy ‘R’, and indeed consistently so with good (2a).

There is one rather different, obscurely cited near-proposal to report from Julius König (1914:75n1), which is also the closest that the literature I know of has come to describing the strange failure of (Dis.2). König’s stated aim, late in life, was to found logic on a phenomenology of ‘undeniable experiences’, or ‘self-evidence’. He remarks – no doubt with verbalized examples in mind, but not giving any – that (Dis.2) is not phenomenologically ‘self-evident’, whereas (Dis.1) is. His explanation is (i) that ‘or’ ambiguously denotes inclusive ( $\vee$ ) and exclusive (XOR) disjunction and (ii) that the ‘self-evident’ among the laws of logic remain valid when ‘XOR’ replaces ‘ $\vee$ ’. It is easily checked by truth-tables that (Dis.1) remains valid, while (Dis.2) doesn’t. But if this hypothesis had been intended to explain language phenomenology, it would fail to explain why (2b) is unacceptable and not simply judged inequivalent to (2a). The theory would also falsely predict as being intuitively ‘self-evident’ the equivalence of (5a) and (5c), which would be implied by (Abs.1) and (Abs.2), and it would leave unexplained the weirdness of (5c). König indeed never mentions (Abs) among the laws of logic and almost as an afterthought he introduces (Ide), which leaves him balancing in precarious equilibrium on the fence between psychology and either sociology or ethics. He notes that (Ide.2) states “how we think ‘ $A$  and  $A$ ’ or, more exactly, how we *intend or decide* to think (*denken wollen*) ‘ $A$  and  $A$ ’” (op.cit. 76). The same is to be said about ‘ $A$  or  $A$ ’. (But note: this is a contradiction-in-terms for XOR.)<sup>21</sup>

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<sup>21</sup>König is the father of König’s Theorem and, as it were, the grandfather of König’s Lemma. His posthumous book, seen through the press by his son, Denes König, also contains (then) advanced thoughts on set theory. I chanced across it long after observing the facts of section 2. Perhaps there is a connection between König’s phenomenological concerns and his tenet that some sets cannot be well-ordered, which he re-

I cannot, of course, rule out that a remedial auxiliary doctrine might yet be found, either utilizing instruments inspired by the Gricean enterprise or others. But a proponent of scepticism about compositional logical semantics need not presently rule out such an eventuality. By the evidential conventions of science and thus, I take it, of philosophy, the burden of proof now rests with the proponent of a logical skeleton conservatively supplemented by credible conventional or ‘conversational’ auxiliaries.

It may be objected that the skeleton is nowhere as rigid as I have implied. Is there not consensus that ‘*if*’ needs a construal in non-classical formalisms, e.g. for counterfactuals or when negated? Quite so, but the non-classical theories of ‘*if*’ which seriously aim both to engage the vernacular and to retain compositionality have each of ‘*and*’, ‘*or*’ and ‘*not*’ retain their familiar logical meanings; see Lewis (1973) as a representative of the field.<sup>22</sup> If two of those go, the modernized logical skeleton will come apart.

Logic here means any logic validating the lattice laws. In recent decades, logics have been discovered or developed which do not validate all, or for that matter any of them. In the proof-theoretic perspective usual of, and always initial to, their treatment – giving a highly general semantics for them is a tricky task – these logics fail to validate one or more of the ‘structural rules’ (see e.g. Gentzen 1934) of traditional logics, among which are some which are correlates of lattice laws. Accordingly, these logics are referred to as *substructural* logics (see e.g. Paoli 2002, Restall 2000 for background).

Some substructural logics notably do not validate (Ide.2), whose proof-theoretic, structural rule correlate is ‘Contraction’. Among these logics there is Classical Linear Logic [LL] with Exponentials (Girard 1987) which has two conjunctions and two disjunctions. This logic is one of ‘limited resources’, because an object used in a proof step, say by application of a Modus Ponens type rule, is used up, and no longer available for another proof step. Indeed, tained after two famous failed attempts to prove it for the continuum of real numbers. Zermelo had followed each attempt with a proof to the contrary, namely that any set can be well-ordered. To do so, Zermelo had assumed the (now known-to-be equivalent) Axiom of Choice, insisting (van Heijenoort 1967: 187) that the Axiom was “self-evident”.

<sup>22</sup>Adams (1975), who has a probabilistic theory fully based on belief or assertibility conditions, does introduce an assertoric ‘quasi-conjunction’ and related disjunction with non-classical properties. However, these operations are subject to severe constraints on compositionality on pain of predicting very counterintuitive inferences.

one of the earliest substructural logics, now known as the Lambek Calculus (Lambek 1958), had its first application in modelling the parse or syntactic production of a sentence as a proof, the objects of which were syntactic constituent types. In such logics (Ide) or its proof-theoretic correlate ‘Contraction’ will typically fail *ceteris paribus*. However, Linear and similar logics can, as it were, switch on (Ide) by use of its ‘exponential’ operators. The exponential turns the formula  $A$  from a scarce resource, whose single syntactic occurrence is used up when used in inference, into an abundant good, somewhat like a dish from the all-you-can-eat buffet. With such devices, LL embeds classical logic. It also has a connection to linear algebra, which was pointed out early on by Yves Lafont of the ENS Paris and runs deeper than just the affordance of a non-idempotent conjunction. Semantics proposed for LL are very far from explicating truth-as-correspondence conditions and the most intuitive of them have been in terms of strictly competitive games, as presaged in Lafont’s work.

I have not got LL to generate intuitive meanings for a usefully-sized fragment of English.<sup>23</sup> Neither have I managed to do so in a revealing way even for minuscule fragments, say, for uses of vernacular ‘or’. Example: Girard (1990) brought to popular attention an appetizing menu-choice illustration of the LL pair of ‘disjunction’ connectives, with credit to Lafont who invented it. The two connectives are each paraphrased by vernacular ‘or’, but one of them is apt for ‘free choice’ uses of ‘or’ (you pick one of soup or salad), the other for uses involving pot-luck ignorance which will correspond to other-determined choice (you get cheese or ice cream at the chef’s discretion).<sup>24</sup> The menu modelling surely serves the cause of logic. Yet I should prefer not to postulate, *as a first interpretive step* in mathematical semantics for the vernacular, a *logical ambiguity* behind these phenomena. (A proposal for ‘or’ similar to Lafont’s is Barker 2010.) One reason for being sceptical of this investigative tactic, even for a language fragment having ‘or’ as its only connective particle, are the very subtle pragmatic concomitants of the difference between ‘free choice’

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<sup>23</sup>I was first apprised of LL in 1988 (by Martin Hyland of Cambridge University) and thereupon started trying.

<sup>24</sup>The very idea of defining dual logical operators in terms of choice accorded to different players in a two-person proof game goes back to C.S. Peirce, who used it informally to characterize  $\forall$  and  $\exists$ . In the 1950s, Paul Lorenzen also applied it to the pair of conjunction and disjunction as they occur in intuitionistic and classical logic.

and other readings of ‘*or*’ (see Merin 1992). For a more direct approach to ‘*or*’ along the lines of Merin (1986), see the Appendix.

The framework of substructural logics brings to formal fruition a dream of Carnap’s in granting logicians the utmost freedom to develop tailor-made derivation systems. At present, I do not see how the descriptive problem turning on the lattice laws can be solved in this framework. Others might succeed in doing so.<sup>25</sup> If so, the body of the present article should yet motivate a need for their endeavours. Its main objective, however, was and is (i) to note a pervasive empirical problem in the parlour or vestibule of philosophy, (ii) to indicate how philosophy has managed to ignore it, and (iii) to affirm that this is an instance of a general methodological problem.

Suppose the quest for auxiliaries that preserve non-sub-structural logic proves futile. And suppose also, perhaps prematurely, that sub-structural logics, too, do not afford a remedy for a sizeable fragment of the vernacular. Or suppose they do, but would saddle one with homophone connectives for which the often alleged and now long discredited ambiguity of ‘*or*’ between ‘ $\vee$ ’ and ‘XOR’ could be paradigmatic. Are we then left with a return to a theory-less theory of meaning for the vernacular? Would the only choice for theory-minded philosophers be one between a leap of faith in things as they are held to be and the deep blue sea of nihilism, i.e. of anti-mathematical philosophy?

I do not think so. However, without a lengthy exposition – for which there is no room in this article-sized essay – the proposal of any conceivable non-conservative alternative must be a largely unsupported statement. Presenting an idea as a statement that lacks detailed substantiation is the philosopher’s equivalent of science fiction. I literally present the idea as such in the Appendix, because this seems like the proper register for a three-page memorandum.

A non-lattice-theoretic algebraic semantics such as the one to be fictionalized need not dispense altogether with a logic that validates notably (Ide). We can at least verbally conceive of such an alternative approach to linguistic meaning as being based on a reversal of priorities. Instead of a skeleton of logic wrapped in pragmatics, language could have a skeleton of pragmatics which, every now and then, is corseted or even stopped dead in its walkabout

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<sup>25</sup>An application of substructural logic to vernacular ‘*if*’, including related uses of ‘*or*’ is Paoli (2012), whose logic HL has three kinds of each. See note 26 below for a paradigm example of the general methodological issue.

tracks by logic of a most classical kind. Pragmatics, if very abstractly conceived, could be as articulate, indeed, in Boole's terminology: as algebraic, as logic.

Let us not take this for granted. Suppose merely that the badness of exx. (2b) and (5c,c') is due – somehow – to an offense against (Ide.2). This, after all, and I speak quite unhypothetically now, is what it will feel like when you reflect on your aesthetic apperceptions. Examples (2b), (5c,c') and (6c) grate on the mind's ear in much the same way. If so, our meaning theory should have to *explain how a meaning is generated that can offend against logic in the first place*. Bare sentence-formation syntax cannot do this, for it is meaningless by definition. By definition, logic as we mostly know it cannot do this either. A logic that did would have to invalidate, for one, (Ide.2); recall p. 19. Thus, something else is needed and logic as we mostly know it would only cut in at some point, quite late in the interpretive day and perhaps in a sparse way. In return, it would make its entry with a bang – here: Boole's fundamental law coming down hard on perceived irrationality – rather than cut out with a whimper, as I believe it will have to when under the influence of Gricean ambitions. Let 'logic' once again refer to logic as most philosophers and working mathematicians know it. Let non-logical or sub-structurally logical theories of meaning refer to the relevant complement. If meanings generated from within this complement conform to the requirements of logic so circumscribed, there is no way to distinguish between the Gricean approach and a non-conservative alternative. But if language is bumping into logic in broad daylight, it must in the first place be heedless of logic.

## **5 Normativity, description, and 'reflective equilibrium'**

One might reply: Grice, either in person or *pars pro toto* for the Gricean enterprise, has saved a logic-based meaning theory in the past, so he will save it this time too. Or rather: one might think so, but not say so, and there would be a good reason for discretion. The thought is not unlike the inductive reasoning of Russell's chicken which had its neck wrung by the hand that used to feed it daily. In fact, the thought's inductive base might be more slender than the chicken's, to the extent that past Gricean claims turn out to have been illusory (recall note 17). The chicken was at least fed real chickenfeed.

All of this sounds so very negative. Let us then think positive. First, a denial of the descriptive adequacy of supplemented logic for paraphrastic equivalence data entails a corresponding *denial of the most obvious form of psychologism about logic*. Our vernacular language is an object of social psychology. Were it to conform at heart to the norms of such-and-such a logic, who could say that this alleged norm of how we ought to reason is not simply a law or requirement of our psychology, much as Boyle's law about gases is a law of physics? Since it does not so conform, philosophers who have the will to believe in antipsychologism and the normativity of logic, but who are not yet fully convinced in their heart, now have an extra plausibility argument to boost their faith.

There are other ways, too, in which the denial of a logical base to linguistic meaning does not impugn the role of logic in analytic philosophy. Informed respect for logic is what distinguishes the would-be Analytic community most clearly from its Continental *bête noire*. This distinctive role of logic is more easily recognized than that of other branches of mathematics in philosophy, say, probability or whatever else it takes to do philosophy of science. What makes logic distinctive *qua* mathematics is that a logic has a consequence relation – a specification of what must be undeniable if such-and-such is affirmed – which indeed defines it. And consequence is undeniably at the heart of all philosophical argument, even if in actual application our notions of consequence may differ subtly from the idealizations of our preferred logician. This distinctive role of logic will continue to be backed up by content even if the vernacular-generating thesis fails, as I think it does. Students and users of logic have many more strings to their bow than this particular application. Logic and logics as pursued by logicians in the *Journal of Symbolic Logic* and several more recently established journals are part of pure mathematics, like geometry and its plurality of geometries. Logics have applications for engineering purposes and for the philosophical reconstructive description of mathematical and scientific practice.

The lastmentioned, descriptive applications of logic are in many ways independent of its relation to the vernacular. For example, a very simple example, there is a way to specify inclusive disjunctions of actual or potential measurement observations without using the word 'or'. We say 'at least one of *A* and *B* is true'. A limited and imperfect fit of logic to the vernacular would suffice to keep us talking nearly enough in line with the norms of our work-

ing logic. For conservative analytic philosophers, this logic will by default be classical logic.<sup>26</sup>

A limited fit does not mean that ‘*and*’, ‘*or*’, etc. ‘*never mean*’ what ‘ $\wedge$ ’, ‘ $\vee$ ’, etc. mean. Limited fit would suffice for, and would not rule out, the felicitous reconstruction of many philosophical and everyday arguments in which these English words occur by direct translation of the very words into the familiar logical correlates. In a passing remark dropped in the most elegant of logic primers, E.J. Lemmon (1965:167) surmised that sentences of our vernacular do not *per se* have logical forms. Rather, he says, it is arguments in which sentences are used that have such forms. This way of identifying the home ground of our best known logics suggests a descriptive alternative to pursue:

Rather than assume that language is logic in a wrapping of mostly parochial syntax and largely universal pragmatics, we could conceive of language predicated on alternative forms of meaning composition at base. However, in sufficiently many contexts of indicational use and in concert with other constraints, this extra-logical base would induce commitments to belief that each conform to the prescriptions of our favourite logic.

A heuristic analogy would be our use of dead metaphor, say, ‘the last leg of the journey’. With dead metaphor we mean one thing, without any metaphoric stretching felt, by means of an expression whose literal, that is, compositional meaning is something other. That meaning is presumed dead, but may turn out to be undead, like Count Dracula at night-time, in certain contexts of use or on being tweaked by the punster.

Autonomous logic and mathematical or scientific practice would take over where the vernacular fails to coincide with the requirements of practice as

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<sup>26</sup> Use of its dreaded explosive device, *ex contradictione quodlibet sequitur* – put simply:  $A \wedge \neg A$  entails *any*  $B$  – will be proscribed if we reasonably require that premisses be evidentially relevant to conclusions. When relevance of  $X$  to  $Y$  is explicated in probability theory, i.e. as  $P(XY) \neq P(X)P(Y)$ , then  $A \wedge \neg A$  is always irrelevant to all  $B$  under all  $P$ . This example could serve as a paradigm for comparing as instruments for explicating vernacular inferential intuitions (i) non-classical logics, among them both paraconsistent, i.e. non-explosive logics and ‘relevant logics’, with (ii) classical logic supplemented and thence constrained by classical probability theory or all but embedded in it as the logic of the underlying proposition algebras.



codified in a logic. Arguing about which logic is right, or right for which purpose, is arguing about what it means to be rational.<sup>27</sup>

We have to live with the profoundly emotive term ‘rational’, I guess. What we should not take for granted, though, is appeal to the kindred term ‘reflective equilibrium’. This mellifluous expression will suggest, and perhaps indeed refer to, the terminal state  $\sigma$  of an iterative procedure  $F$  of reflection which remains stable under more reflection,  $F(\sigma) = \sigma$ , and so affords both theoretical perfection and of tranquility of mind. However, I believe that there are referents of greater argumentative importance and that the relevance of the headline referent is mainly to lend their use more *gravitas* and goodness.

The process of reflection could be pictured as a dialectic among multiple *mentis personae* of the reasoner, call them Face-the-facts, Give-us-norms and Least-effort. ‘Equilibrium’ could then refer to its standard game-theoretic instance: a combination of choices by all players (each player choosing one among his options for individual action) that jointly determines their individual payoffs and such that no player can improve his position by a unilateral change of choice. With these *personae*, equilibrium combines nicely with physiomorph images of an equilibrium of forces or with sociomorph images of equitable division.

However, in games there need be nothing globally optimal let alone fair about an equilibrium. Being stuck in a suboptimal if not pessimal equilibrium is a salient predicament in interactive decisionmaking. And knowing our three players, the game will be one of divide-the-pie, and the favoured equilibrium most likely one where Give-us-norms and Least-effort divide the pie among themselves. This predicament is indeed what I believe the most important current use of the phrase is apt to get the philosopher into.

There are good cases of it, when the recommendation is that we regiment our professional usage. We conduct our arguments in a language of logic that had its functional vocabulary ‘syntactically sugared’ to resemble English, as computer scientists would say, and we are out-front about this. The bad cases arise when the provenance of this language is forgotten and when appeal to Mr and Ms Natural’s vernacular language intuitions is made in philosophical argument about what language (or mind) is. It is in this grey zone of equivo-

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<sup>27</sup>I am pretending that attention can be confined to deductive logic. In actual fact, it must extend to probability or other frameworks for reasoning under uncertainty.

cation<sup>28</sup> that appeals to reflective equilibrium or a tacit ‘don’t look now’ allow philosophy to have its cake and eat it. Some reasons have been outlined in the first section why an appeal to reflective equilibrium will also sustain peace of mind of the not-for-profit variety. However, to understand peace of mind as such it helps to consider its opposite: disquiet. Here is some exploratory field-work on it.

A philosophical logician with a keen interest in philosophical thought experiments was asked, in 2012, to consider hypothetically the following question: What would it feel like if it turned out that our vernacular is not based on a skeleton of logic in which ‘and’ means  $\wedge$  and ‘or’ means  $\vee$ ? His reply was that it might feel as if ‘Seven plus five is twelve’ turned out not to mean ‘ $7 + 5 = 12$ ’. I should add my own bit to this *impromptu* intuition, in line with the inset proposal on p. 24 above. On present showing, I feel that the two expressions would not mean the same when considered compositionally. Yet any utterance of the first sentence would, I also feel, continue to mean what ‘ $7 + 5 = 12$ ’ means. The combination of these two properties would feel as if we did not quite know what we are saying, and in a sense much more acute than might be claimed for dead metaphors which we are sometimes said to live by.

When it comes to our own language, there are good reasons, then, to wish to be able to believe that logic is descriptive, too. The received view on this has a counterpart in physics. We believe in Newtonian rigid body mechanics, the mechanics of conservative forces. We believe in it in spite of trolleys slowing down without an extra push or pull and in spite of feathers falling more slowly than pebbles. We do so, because an auxiliary theory of friction, i.e. of non-conservative forces that turn kinetic energy into heat, and of aerodynamics is available to us. In reflecting on earthbound mechanical engineering purposes that can take materials for granted we do not have to worry either whether classical, Newtonian mechanics is indeed a special case of relativistic mechanics or how it can articulate with quantum mechanics. Gricean and perhaps post-Gricean supplements play the role of a classical auxiliary for logic (as commonly understood)..

But suppose we come across phenomena for which there is no respectable auxiliary theory in sight. In such moments, appeals to ‘reflective equilibrium’

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<sup>28</sup>Here is a poetic instance from neighbouring linguistics. Having exemplified (Dis.1) (p. 8 above) in English, Keenan and Faltz (1985:71) invite their readers to “construct an example showing that [(Dis.2)] should be satisfied”.

tend to be made; and in such moments, philosophy begins to differ decisively from physics and the other natural sciences. Should it not differ from them anyway? No doubt it must, but I do not see why it should differ on this point of method. Philosophy, when it makes claims about – not simply claims on – the vernacular language, is, after all, making empirical claims. It cannot all farm them out to linguistics, for if it did, we should have to stop doing and teaching philosophy of language and much of philosophical logic.

Appeal to reflective equilibrium under which phenomenology and its observables must give way to a coalition of prescription and economy of thought obscures the taxonomic fact that systematic philosophy is in parts an empirical discipline. Philosophy can steer clear of such appeals if it takes care to distinguish its normative and its descriptive aspects and to keep each one from subverting the core business of the other. There may be areas of philosophy in which it is difficult to make a workable distinction, but the theory of meaning is not one of them.

## Appendix: The View from Triple Sec

Triple Sec is a planet of Beta Chimerae, one orbit outward from Twin Earth. The Triple Sec Institute of Philosophy [TSIP] have made a study of English, presently the most natural language on Twin Earth. They have hit on the idea – congenial to their conservationist mindset – that speakers of English sentences are, in the first place, both imaginative-intuitive beings (*Anschauungswesen*, as their Kant scholars germanize) and passionate-desiderative beings. Accordingly, says a TSIP spokesperson, sentences of English can be expected to have their natural interpretations of first resort not in boolean or similar lattice algebras of truth or proof conditions, but in rather different mathematical structures. These have for instances, on the one hand, the Euclidean spaces of geometry, physics, and statistics, and, on the other hand, the commodity and service bundle spaces of economics. Instances of the first kind also include spaces of representations by images, as familiar from handmade and computer graphics. Images are not truth- or proof-valued by constitution. The economically interpreted spaces are likewise structured, not by truth and consequence, but by comparative and quantitative preferences, i.e. by essentially pragmatic value relations. Their objects are preference-valuables and disvaluables. If objects from either kind of space were meanings of sentences, they would, by definition, be non-propositional meanings, at any rate to start with.

What all these spaces have in common, so TSIP scholars now observe, is that they are linear algebras – of the most familiar kind predicated on the intuitive notion of *quantity*, i.e. over ordered rings or fields, as mathematicians say, and thus nothing exotic based on number systems in which  $1 + 1 = 0$  or  $7 + 5 = 1$ . Linear algebras are also known as vector spaces. (TSIA operatives on Twin Earth report that their rudimentary doctrine, initiated by one Des Cartes, is taught there at pre-university stage; and the core of it, under cover of ‘arithmetic’, already to six-year-olds!) Twin Earth English sentences, say, *A*, will thus denote abstract objects, *A*, called ‘vectors’, just as English sentences on remote Earth are said by colleagues there to denote abstract objects which are elements of boolean algebras and are called ‘propositions’. And just as ‘proposition’ suggests a certain argumentative interpretation, so TSIP scholars, punning on vistas and economic expectations, call Twin Earth sentence meanings ‘prospects’. Prospects, including those denoted by connective-free sentences are, in turn, componible from phrasal and content-word meanings that are also elements of linear spaces and combine as suitably dimensioned vectors and linear maps or, in suitable circumstances, tensor product formation. TSIP methodologists have noted that structural ‘distributional semantics’ for content words, elicited in computational linguistics by statistical latent structure analysis, also finds meanings in linear spaces; but makes for a rapid exit to truth-valued propositions when it

comes to sentence meanings (so in Coecke, Sadrzadeh & Clark 2010). TSIP scholars, traumatized by data on absorption, distribution etc., prefer to give prospects a ride for their money before eventually and gingerly relating them to propositions.

Sentence-conjoining ‘*and*’ will thus denote vector addition, ‘+’, of prospects; analogous things will hold for phrasal conjunction. (TSIP investigators find unprofitable for their immediate purposes a ‘quantum logic’ use of linear spaces, which by way of denotations in subspace lattices leads straight to ‘meet’ and ‘join’ connectives; see note 10.) The laws of vector addition closely resemble those of arithmetical addition, but vectors need not be numbers, so visualize vector ‘+’ as ‘ $\oplus$ ’, if that liberates the imagination. The key algebraic difference between ‘+’ and logical ‘ $\wedge$ ’ is that  $X + X = X$  is invalid. Vector addition  $X + Y$  is generalized in linear algebra to ‘linear combination’  $aX + bY$  of vectors  $X$  and  $Y$ , where  $a$  and  $b$  are real number coefficients, called ‘scalars’. Addition is the special case  $a = b = 1$ . TSIP poetologists reply to worries about  $a = -500$  and  $b = \sqrt{2}$  that a semantics for a language  $L$  in a combinatorially generable or other domain of interpretation  $D$  must attach to every sentence of  $L$  an object in  $D$ , but need not require every object in  $D$  to be expressible in  $L$ . Real junk, they say, will be unspeakable. For ‘ $X$  or  $Y$ ’, they hypothesize context-indexical, scalar-valued coefficient variables constrained by  $\{0, 1\} \ni b = 1 - a$  and thus  $aX + (1 - a)Y$ . The choice of value is *ceteris paribus* unspecified by verbal means, but is by indicational convention left to Nature, whose choice a cagey speaker may be privy to or even execute; or, in deeply imperatival discourse, to the addressee. Each occurrence of ‘*or*’ gets a *prima facie* independent choice and thence a distinct coefficient variable.

Despite superficial appearances, Twin Earth ‘*or*’ is not logical XOR. Inclusive and properly exclusive readings require induction by material or rhetorical interests that are imputable in a given context of use. The TSIP bargain basement of Twin Earth ethnographica has a hint on offer: ‘*You may take my wallet or my bike*’ tends to be read exclusively, or rather: ‘at most one of them’. By contrast, ‘*You must give me your wallet or your bike*’ reads dually, ‘at least one of them’ and thus inclusively. TSIP management conclude that competent speakers of Twin Earth English appear to be veritable *homines oeconomici*.

TSIP advice to mental space travellers who would dream of mapping ‘*or*’ on two or more distinct connectives of a substructural logic such as Linear Logic is, accordingly, pragmatic. Such travellers had better plan a route by way of a resting place: ordered linear spaces and a single, univocal, if intrinsically indexical connective operation in the linear combination family. Against that backdrop, which sets a minimum standard of descriptive adequacy, they might profitably investigate for their descriptive potential pure substructural logics, say, logics with a constant-sum game semantics. (Andreas Blass, so the TSIA residency on remote Earth tells them, has offered such

semantics for linear logic, as presaged by a fundamental connection to abstract games spelt out early on by Yves Lafont.) After this excursion into what TSIP scholars still consider science fiction, let us return to their perceived reality.

Assuming that ‘*A and A*’ designates  $A + A$ , it can mean *A* only if ‘*A*’ means Nothing, the null vector. For iterables (e.g. ‘*Kim talks and (Kim) talks*’) additivity is just fine. For stative ‘*A*’ (e.g. ‘*Kim is tall*’) it generates what TSIP observers call a ‘double image’. It offends the Twin Earth ethics of thought for sober argumentation – also subscribed to on Triple Sec – which is enshrined, for one, in (Ide.2). By contrast, ‘*A or A*’, designating  $aA + (1 - a)A$ , will always denote *A*, i.e. what ‘*A*’ denotes, regardless of whether *a* is instantiated to 0 or to 1. Its oddity, say TSIP contemplators, arises solely from its being an instance of Hobson’s Choice. Now, linear combination obeys in all essentials the distributive law  $(x + y)z = xz + yz$  of plain arithmetic. The TSIP report accordingly observes that the offending, fully unacceptable examples (2b, 5c) all have options, for some possible assignments of 0 and 1 to scalar variables in occurrences of ‘*or*’, where a double image appears among the possible options.

Thus,  $A + [aA + (1 - a)B]$ , of which (5c) is an instance, equals  $A + A$  when  $a = 1$  and it equals  $A + B$  when  $a = 0$ . The first option is a double image. It cannot simply be ignored: doing so would make ‘*A, and A or B*’ equivalent to ‘*A and B*’. Neither can logic cut down the first option to sensible *A* without a fuss. If it did, ‘*A, and A or B*’ would intuitably (not just normatively) mean what ‘*A, or A and B*’ means, since  $aA + (1 - a)[A + B]$  reduces to *A* when  $a = 1$  and to  $A + B$  when  $a = 0$ . The form ‘*A, or A and B*’ is perfectly acceptable and its interpretation, so the TSIP report surmises, is correspondingly intuitive. By similar computations, and remembering to use distinct coefficients for distinct occurrences of ‘*or*’, TSIP scholars have also verified that (1a) and (1b) denote identical sets of vector options, while (2a) and (2b) do not. TSIP refers to Merin (1986, 1997, 2012) for considerations on negation, on probabilistic evidential relevance linking linear prospects and boolean propositions, and on predicate languages with multilinear semantics which allow people to say and mean things like ‘*Kim and Lee sang or danced*’ or ‘*You and you owe me a drink*’.

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